1. (34 pts) Evaluate the following integrals and simplify your answers.

   (a) $\int \left(\tan^2 \theta + 1 \right) \sec^2 \theta \, d\theta$

   (b) $\int \frac{2x^2 - 5x + 6}{x^3 + 3x} \, dx$

   (c) $\int \frac{dx}{x^2 \sqrt{25 - x^2}}$

2. (26 points) Consider the integral $I = \int_{-1}^{1} (2 - x) e^x \, dx$.

   (a) Estimate the value of I using the trapezoidal approximation T_2. Express your answer in terms of the number e and simplify.

   (b) Estimate the error for the approximation T_2. Express your answer in terms of the number e and simplify.

   (c) Find the exact value of the integral.

3. (22 points) Determine whether the following integrals are convergent or divergent. Explain your reasoning fully for each integral. **If the integral converges, find its value**.

   (a) $\int_{-1}^{1} \frac{x^2}{\sqrt{-3x + 9}} \, .$

R. Shade in the region R.

evaluate, an integral to find the volume of the solid